Hydrodynamic design of hull and appendages

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Henrik Andreasson
working for Profjord with developing and delivering of hydrodynamic solutions and design.

Received M. Sc. degree in Naval Architecture 1999 at Chalmers University of Technology.

Worked for SSPA Sweden AB from 1999 to 2008 as project manager for model test and CFD projects, primarily working with hull optimization.

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- The importance of choosing the optimal main particulars
- The importance of correct trim
- Dynamic stability and importance of hull design above design water line
- The impact of wind loads
- The use of model tests and CFD analysis
- The impact of propulsion arrangement to the hull design
- The impact of steering arrangement to the hull design
- The design of appendages for high speed and related problems.

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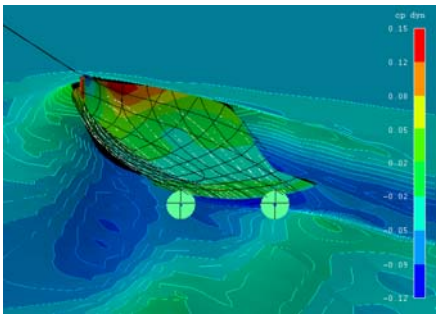

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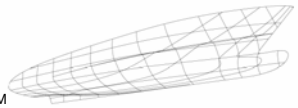
The importance of choosing the optimal main particulars

- Length over all
- Beam over all
- Draft restriction
- Displacement
- LCG
- VCG
- Metacentric height
- Transom draft
- Propeller shaft RPM
- Propeller diameter
- Project chine area and distribution
- Hard chine or round bilge
- Chine beam
- Dead rise
- Transom beam



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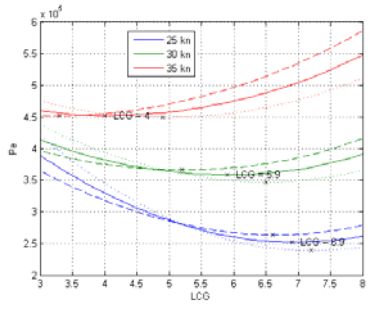
The importance of choosing the optimal main particulars



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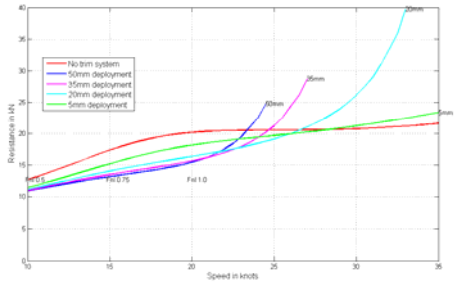
The importance of correct trim



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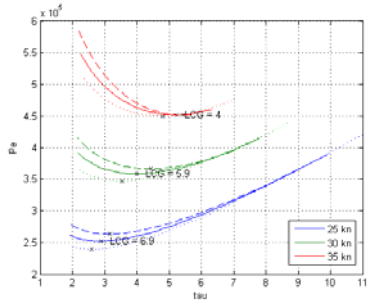
The importance of choosing the optimal main particulars



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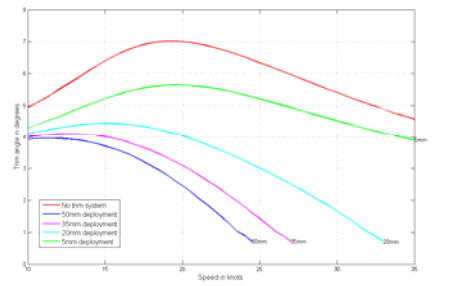
The importance of correct trim



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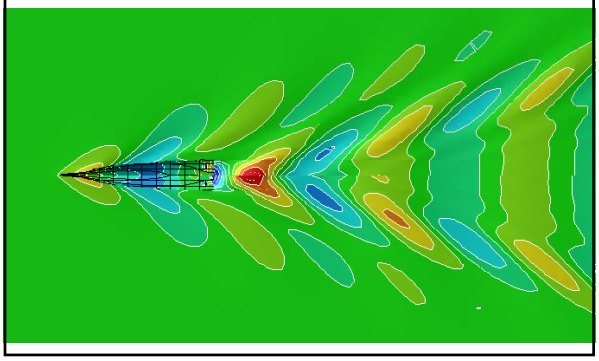
The importance of correct trim



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The impact of propulsion arrangement to the hull design

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The impact of propulsion arrangement to the hull design

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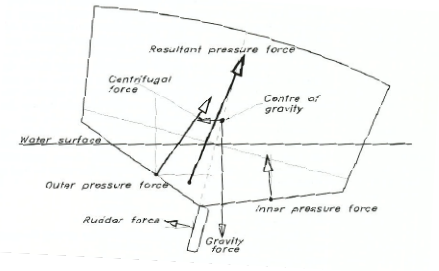
The impact of steering arrangement to the hull design



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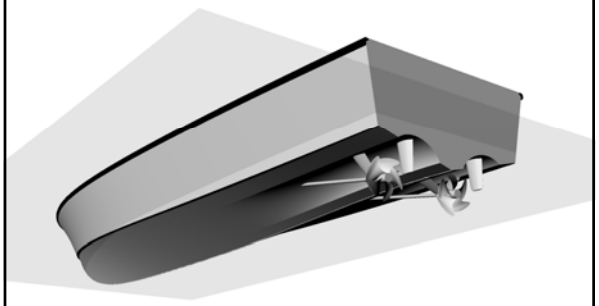

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Dynamic stability and importance of hull design above design water line

- Porpoising
- Bow diving
- Bow steering
- Chine riding
- Chine walking

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The impact of steering arrangement to the hull design

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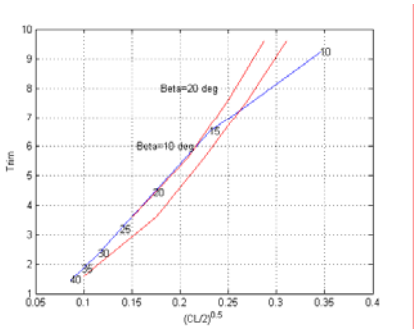
Dynamic stability and importance of hull design above design water line



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Dynamic stability and importance of hull design above design water line

	HYDROSTATIC → HYDRODYNAMIC			
	DISPLACEMENT	SEMI-DISPLACEMENT	PLANING	
	INCREASING FROUDE NUMBER →			
TRANSVERSE	TRANSVERSE HYDROSTATICS $GM_T \leq 0$	LOSS OF GM_T DUE TO WAVE EFFECT	ROLL INSTABILITY NON-ZERO HEEL NON-OSCILLATORY	"CHINE WALKING" DYNAMIC ROLL OSCILLATION
LONGITUDINAL	LONGITUDINAL HYDROSTATICS $GM_L \leq 0$	LOSS OF GM_L DUE TO WAVE EFFECT	TRIM INSTABILITY BOW DROP NON-OSCILLATORY	"PORPOISING" DYNAMIC PITCH-HEAVE OSCILLATION
COMBINED	COMBINED $GM_T \leq 0$ $GM_L \leq 0$	COMBINED WAVE EFFECT	BROACH NON-OSCILLATORY	"CORKSCREW" PITCH-YAW-ROLL OSCILLATION

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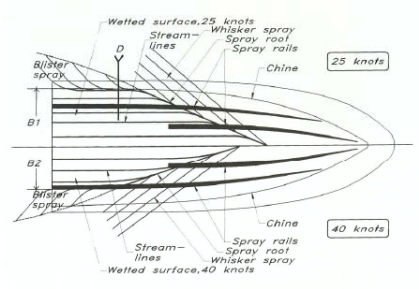

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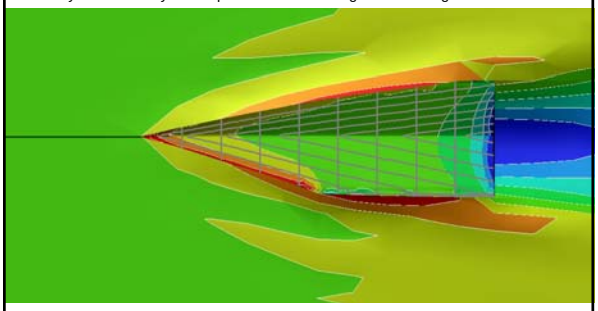

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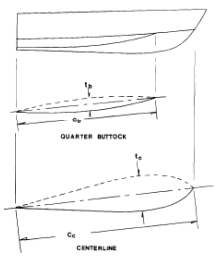

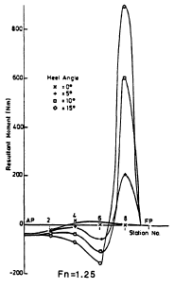

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The impact of wind loads.

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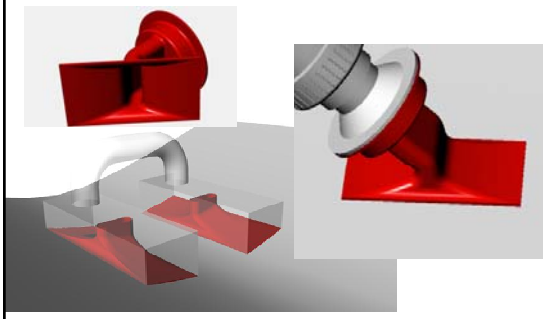

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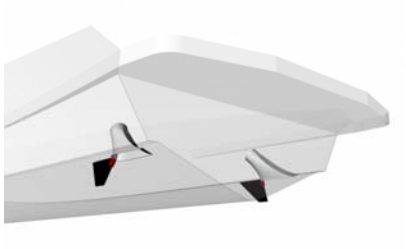

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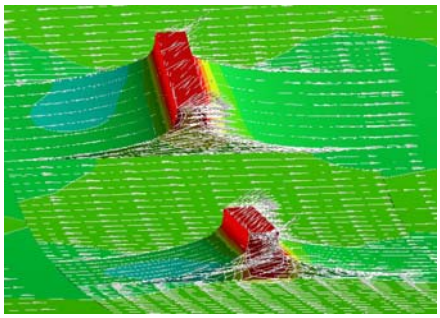

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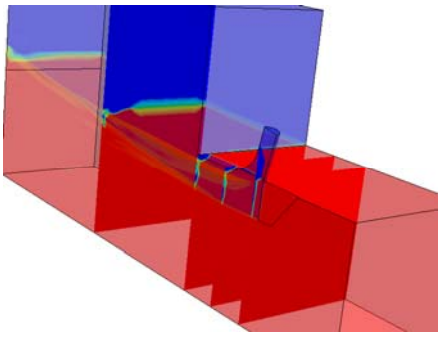

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